Hobbies WEEKLY

CONTENTS

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A HAND-PROPELLED

CHILD'S CAR

HERE is a topping little self-propelled go-car that could be made up for the smaller boy or girl. The exercise gained by running this around would be of great benefit, as well as giving the youngsters a lot of fun. Of course, it is a very simple toy to make and has been designed on easy lines so that it can be made up quickly.

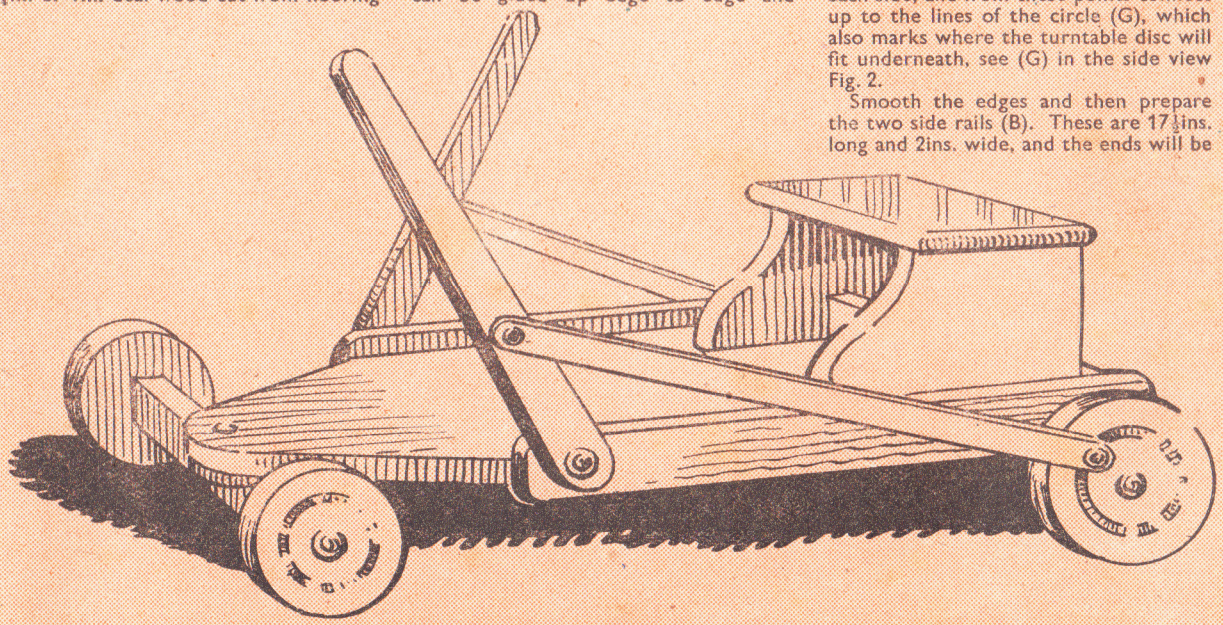
There is really not much wood required for making it, a few pieces of ¾in. or 1in. deal wood cut from flooring boards would answer quite well. In Fig. 1 we see a plan of the car, giving some useful measurements, while in Fig. 2 is a side view, showing how the various parts are assembled and the method of propelling the car along by means of two hand levers connected by rods to the two rear wheels.

The floor (A) of the car measures 27ins. long by 8ins. wide, and if a single piece of sound wood to this width cannot be procured, then two widths can be glued up edge to edge and further strengthened by gluing and screwing two cross battens to the underside.

Axle Bar

The rear axle bar should, perhaps, answer for one cross batten, as the dotted line (F) shows on the plan. Taper the front of the floor by first describing the circle to 1½ins. diameter, see dotted circle. Then set a length of 17½ins. from the back end of the piece each side, and from these points connect up to the lines of the circle (G), which also marks where the turntable disc will fit underneath, see (G) in the side view Fig. 2.

Smooth the edges and then prepare the two side rails (B). These are 17½ins. long and 2ins. wide, and the ends will be



rounded off and made smooth. Screw the rails to the floor in the manner shown in Fig. 2 with an equal margin each side.

The Seat

Now make the seat from the four pieces shown in the enlarged detail in Fig. 3. Mark out the shaping of piece on to one piece of stuff measuring 7ins. by 4ins., and after cutting this round, use it as a template for outlining the second

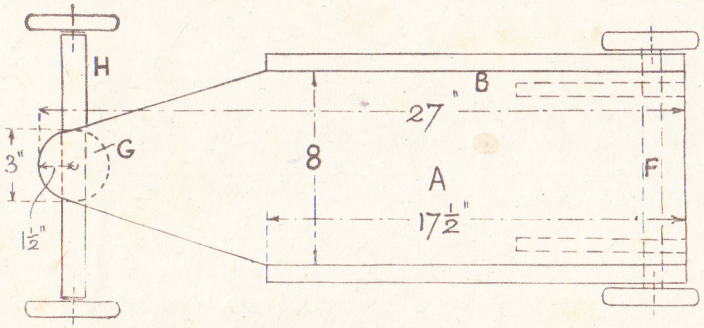


Fig. 1—Plan of main platform and front wheels

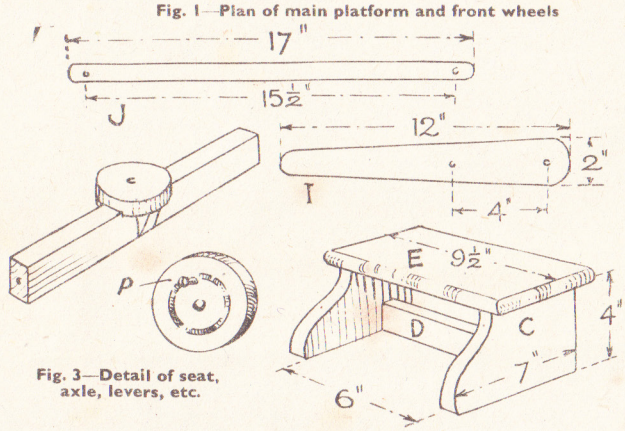


Fig. 3—Detail of seat, axle, levers, etc.

end piece. Connect the ends by nailing on the top (E) which is 9½ins. by 6ins. Round off all four edges of piece (E), and then fit and fix the under rail (D) which should be 6ins. long by 1½ins. wide by ⅞in. thick.

Seat Fixing

The completed seat should be held in position on the floor and screwed on from beneath. The back axle, piece (F) is 10ins. long by 1¾ins. by ⅞in., and is screwed direct to the floor 1in. in from the rear edge of the floor. The disc (G) is of ½in. wood, and bore a hole in the centre for the pivot screw.

In the underpart of the disc, and across the middle of it, cut down and chisel out a ¼in. deep recess to fit over the axle bar. Glue it in place and see that the screw holes in both are in line.

Fix the axle into the floor by means of a long stout round-headed screw driven through the floor and through the disc into the cross axle. Slip a washer under the head of the screw and see that the axle bar swings freely on its pivot screw. If it is necessary to stiffen the connection between the disc (G) and the axle (H), a couple of angle blocks cut from thick wood may be glued and nailed on, as shown in the side view Fig. 2. The same remark applies to the back axle, as seen at (F) in the same diagram.

The wheels may be cut from ⅞in. wood and rounded on the treads with coarse and fine glasspaper. Bore holes in the centres for the axle screws on which also must be threaded washers. Ready-made wheels, 4ins. diameter, may be got from Hobbies if desired. These are well turned and painted ready for fixing direct to the axles. Round-head screws should be used for the fixing of the front pair of wheels.

For the rear pair, however, countersunk screws must be run in flush with the face of wheels, so as not to hinder the connecting bars from revolving freely. Fix the wheels with a washer behind each, and one under the heads of the screws of the fore pair of wheels. Large washers should be used behind the wheels, moderately thick ones to prevent the wheels rubbing against the sides of the floor.

The Levers

The hand levers—one is shown at (I) Fig. 3, are cut from 1in. deal and to the measurements shown. Although the length is shown as 12ins., it can be made longer if thought necessary, according to the age and size of the youngster who will use the toy. The narrow top part of the levers should be rounded off smooth to afford a safe and comfortable grip for the hand.

Fix the levers to the side rails (B) by means of round-head screws, washers being included on the outside. The connecting rods (J) in Fig. 3 are made from iron bar about ¾in. or so wide by ⅛in. thick. Should this be difficult to get, then hardwood can be used, about 1in. wide and ⅜in. thick.

Oak or beech would be a most suitable wood here. The pivot screw for the rod is shown at (P) in Fig. 3. Drill holes in the rods, as shown, and connect them to the wheels and the levers with round-head screws. This completes the work of construction.

Clean and Paint

Give the woodwork a good rubbing up with glasspaper and then paint it two coats good oil paint. Bright colours should be used. A word as to the screws which are important, being the pins on which the propulsive motion works. Use 2in. No. 12 round-headed iron screws, except for the rods which should have 1¼in. or 1in. screws.

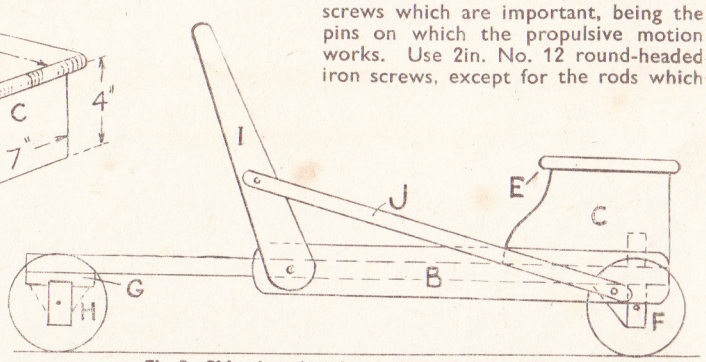


Fig. 2—Side elevation showing mechanism detail

If an even hand motion is required, meaning so that when one hand is forward, the other is drawn back, the toy should have a through rear axle bar to which the wheels are rigidly fixed, this axle running smoothly in fixed and drilled bearers.

At present in the toy given here the wheels bear no relative position one to the other, so that the hands are thereby not uniform in motion. However, the wheels could be placed in position to get the correct forward and backward motion just before having a run in the car.

The radio constructor can make an economical set in

THE SPARES-BOX THREE

THE radio constructor who wishes to make up a receiver using such parts as he may have to hand, or can most easily obtain, will find this circuit ideal. None of the components or valves are critical, good results being obtained even when considerable latitude is allowed in the choice of these items.

Even if all parts have to be bought, the total cost, including valves, need not exceed one pound, and this will be further reduced if some of the components are already to hand.

Tuning Coil

This is wound on an insulated tube, either bought, if not to hand, or made by rolling glued cardboard or brown paper round a suitable former. If a tube is made, allow it to dry thoroughly, then varnish it, if possible, to prevent damp being absorbed. Some household commodities are packed in cylindrical cardboard containers, and these can be used instead, though they are less strong than paxolin or ebonite formers.

To begin the coil, anchor the end of a reel of insulated wire at point (A) (Fig. 1), by passing it through two small holes. Leave the end a few inches long. The turns are then wound on fairly tightly, closely side by side, until point (B) is reached, at approximately the centre of the winding between points (A) and (C).

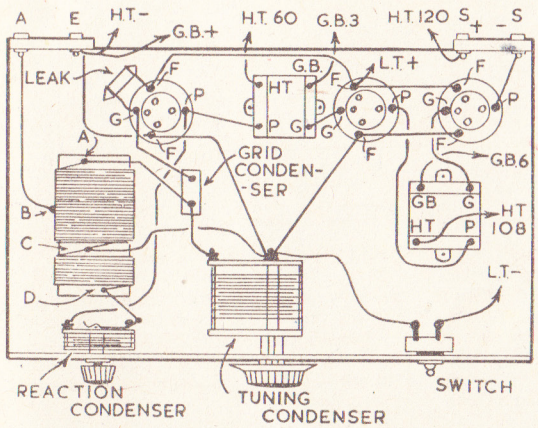


Fig. 1—The complete wiring diagram

To make this tapping, form a loop about 4ins. long in the wire, and draw it through two small holes; do not cut or fracture the wire. Then continue the winding to point (C), where another loop about 4ins. long is made, as for point (B). Leave a ¼in. space, then put on the smaller winding, ending at (D).

Turns

The number of turns and gauge of wire are not critical, but should be fairly accurate, for best results, and will depend upon the diameter of the former. The following table gives the diameter of the former, the size and type of wire, and the number of turns for the winding between points (A) and (C).

In each case point (B) is at about the centre turn of the winding, and the coil between (C) and (D) is two-thirds the number of turns between (A) and (C). In this table, 'D.C.C.' indicates Double Cotton Covered wire, and 'Enam.' Enamelled wire.

Former Diameter	Wire.	No. of Turns.
1in.	32 Enam.	90
1½ins.	28 D.C.C.	94
1½ins.	32 Enam.	65
2ins.	28 Enam.	60
2ins.	28 D.C.C.	68
2½ins.	24 D.C.C.	58
2½ins.	28 Enam.	40

By following this table, any tube and wire to hand should prove approximately correct.

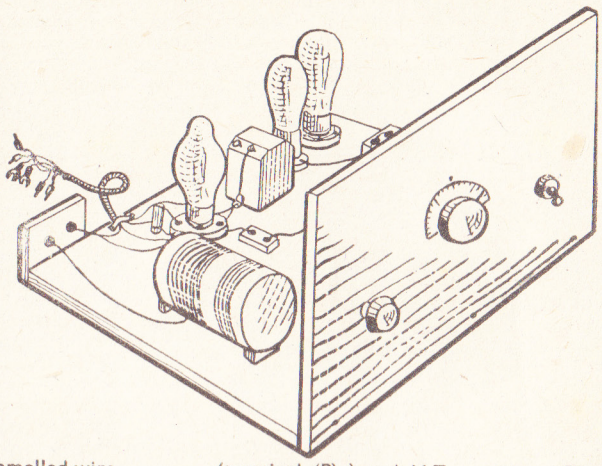
Variable Condensers

Normal values for this circuit will be ·0003 mfd. for reaction and ·0005 mfd. for tuning. The reaction condenser can be a solid-dielectric one, and the tuning condenser should, for preference, be air-spaced. However, a value of ·0002 or ·0005 will do quite well for reaction. It is also permissible to use a solid-dielectric condenser for tuning, but a capacity lower than ·0005 is not recommended, as the wavelength coverage of the set will be reduced.

A small knob is required for the reaction condenser, and a large knob with pointer or dial, for tuning. It is possible to draw up a tuning dial, marking stations on this when they are found.

Transformers

Two transformers are used for coupling, and these may have a ratio of between 1:3 and 1:5. The usual type of markings are shown in Fig. 1, but some transformers are marked (P) and (S). With these, take the two tags or terminals on the (P) side to valve plate (terminal (P)) and H.T. positive. The tags or terminals on the (S) side go to valve grid (G), and Grid Bias.



With any type of transformer, it may be desirable to try reversing over the secondary (G and GB) connections, as in some cases a slight improvement in results will arise. This should be tried if uncontrollable howling commences when the set is switched on.

Resistance Coupling

Either, or both, of the transformers may be eliminated by using the resistors and condenser shown in Fig. 2 instead. If one transformer is to hand, use it between the centre and output valves, and employ the R.C.C. circuit between detector and centre valve.

The leak shown in Fig. 2 should be, for preference, ·5 megohm. However, values between ·25 megohm and 1 megohm will work quite well. The anode resistor should be 50,000 ohms, but values between 35,000 ohms and 100,000 ohms are quite satisfactory, for the detector valve. If this type of coupling is also used between centre and

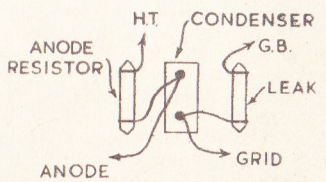


Fig. 2—Alternative coupling circuit

output valve, do not use a value over 50,000 ohms for the anode resistor of the centre valve. Here, 30,000 ohms is most generally suitable.

The best condenser value is ·01 mfd. mica type, but values between ·005 and ·1 can be used.

Resistance-capacity coupling does not provide so much volume as the use of transformers. If it is employed, comparing Fig. 2 with Fig. 1 will show how it is wired in.

Other Parts

Any small on/off switch can be used, and three 4-pin English type valve-holders. If these have terminals, no soldering will be necessary. The detector leak (see Fig. 1) should be 2 megohms, but, if to hand, values between 1 and 3 megohms can be used. The grid condenser in Fig. 1 is best of ·0003 mfd. capacity, but values between ·0001 and ·0005 can be used.

Terminals or sockets can be used for Aerial and other connections. (A) is for Aerial, and (E) for Earth. The speaker is connected to sockets (S). Moving-coil speakers *must* have the usual matching transformer. With such speakers, there is no polarity to observe. With the old type moving-iron cone speakers, however, the correct polarity should be observed, as shown in Fig. 1.

The receiver is made on a baseboard about 7ins. by 10ins., with a 3-ply panel of similar size. A cabinet can afterwards be made in the usual style. Small strips of dry 3-ply can be used for Aerial, Earth and Speaker sockets, but ebonite or similar material is preferable, if to hand.

Any thin insulated wire is suitable for wiring up, and flex is used for the battery leads. The latter may be twisted together, and secured by a clip at the rear of the baseboard.

Valve Types

For the left-hand holder, a detector type valve is best. A low-frequency valve is used in the centre holder, and an output valve in the right-hand holder. Suitable types are, HL2 for detector, 210LF for centre holder, and LP2 for output. However, a wide variety of valves will give good results, though very old valves may not provide very much amplification.

Any 2-volt triode valves to hand can be tried, changing them from holder to holder to find their best positions. If the receiver is insensitive, this will indicate that the valve used for detector is in rather poor condition. If distortion arises, and volume is not very good, the centre or output valve should be suspected. A detector-type valve is not suitable for output purposes.

With good valves, satisfactory results should be obtained at once. However, the grid bias voltages used will depend upon the individual valves, and considerably influence results. The effect of varying these plugs should therefore be tried. Too much bias will cause low volume and distortion; too little bias will greatly increase the high tension current consumption. So use the highest figure of bias which does not cause distortion.

With R.C. coupling, the anode current has to pass through the anode resistor. Therefore about 90 to 120 volts will need applying, instead of the 60 to 108 volts shown in Fig. 1, for transformer coupling.

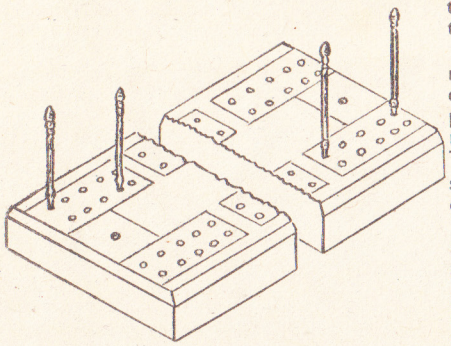
The set will, of course, work quite well with lower voltages, but those shown are most usual. If lower H.T. voltages are used, the grid bias plugs must also be inserted in lower-voltage sockets in the bias battery. Use a 2-volt accumulator for L.T. supply.

Final Notes

If it is desired to make a 2-valver, omit the second transformer and third valveholder, taking a lead from (P) on the centre holder in Fig. 1 to the negative speaker socket. No other changes are necessary.

Reaction is used to build up volume of weak stations. If a long, outdoor aerial is used, selectivity of tuning may be increased by wiring a small condenser in series with the aerial lead-in, or winding a coil with the aerial tapping (B) only a few turns from point (C). If an extremely short indoor aerial is used, take this directly to point (A) on the coil.

A PERSPEX PEG SCORE BOARD



HOW would you like to use a handsome looking plastic score board for your games of dominoes, and cribbage? This one is made from a piece of Perspex 7⅜ins. long, 2ins. wide, and 8mms. thick. To true up the edges of this, cut a piece of Perspex, place the material between two smooth surfaces of soft wood in a vice, and draw file across each edge in turn.

It is best to use a 10in. smooth parallel flat file for this purpose, and test your work frequently with the try-square.

The broken plan of the model shows six panels of ten score-holes, but in the actual article there are twelve, six on either side, with ⅛in. gap between the panels. Use a steel ruler and a metal-work scriber to mark these panels on the Perspex, but be cautious to inscribe on the surface, only the lines as shown in the plan.

Any other marks scratched on the material will spoil your model. You can 'play safe' by first setting out the panels on the work with an ordinary ruler and an indelible pencil point. Then you can mark in the permanent scriber lines and rub the other blue ones out with a wet cloth.

Make quite certain that the score-holes appear in alignment when all the columns in the panels are completed. Failure to do this will result in unsightly drilling. For this work, secure the Perspex horizontally between two stout battens of spare wood on your bench, and drill out the score-holes with a hand-drill fitted with a No. 47 B.A. clearance drill.

It is much easier to drill in this fashion than to work with the plastic in a vice. Drill the holes to about 4mms. in depth, i.e., to about half the thickness of the material.

A Glossy Surface

Now chamfer, by cross filing the upper perimeter of the Perspex to about 1/16in. Smooth all filed surfaces, at first with No. 1 glasspaper, and finally No. OO glasspaper. Give your model that cut-glass appearance by rubbing it down well with a piece of old sock moistened with Silvo. Then vigorously rub off the white film of Silvo with some silk.

The marking pegs are made from discarded knitting needles of preferably sizes 9 or 10. A pair of red, and a pair of green look delightful in this transparent plastic.

These pegs are 1⅜ins. long, and can be made with fancy knob-shaped tops, which you can work with a 3in. half-round smooth file. The points of the pegs must be tapered to fit the score-holes tightly. This tapering is done by rolling the peg-points with the fingers, between two rough surfaces of a folded piece of coarse glasspaper.

This Perspex score board is one very useful plastic model which will never fail to draw admiration. To those who see and use it for the first time, the coloured pegs and the perfect transparency of the plastic are the real attractive features of the model. (334)

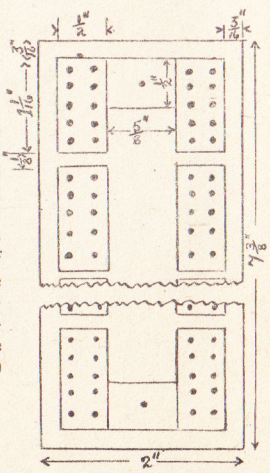


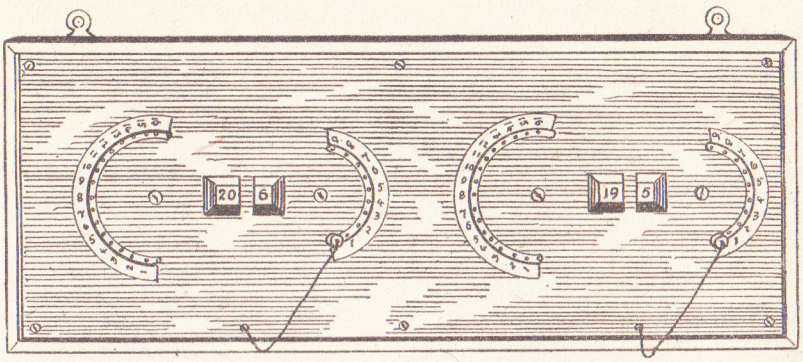
Fig. 1—Plan of board

Another useful and novel type of

AUTOMATIC DART SCORER

FOLLOWERS of this popular game may be interested in this article, which describes a moderately easy scorer, requiring no gear wheels or other difficult parts. As the title implies, the scoring is automatic, requiring no mental arithmetic on the part of the players. A half view is given in Fig. 1 only, it being understood that the second half is identical. This is how it works.

Scoring is done by rotating the discs, the rotation being effected by inserting a metal plug in one of the small holes in the discs and drawing downwards. The right disc is for units, i.e., 1 to 9. We will call this the (U) disc for subsequent reference. The left disc is numbered to 30, and will be referred to as the (T) and (H) disc (tens and hundreds). A total of 300 can be scored.



Mechanism

The automatic arrangement which rotates the (T) and (H) disc, when the score requires it, consists of an upright lever, seen in the diagram, with a small projection at its middle, which a bar across the (U) disc presses against at every tenth number, and moves the lever to the left, the pawl on it catching the teeth on the (T) and (H) disc and moving the latter one number forward.

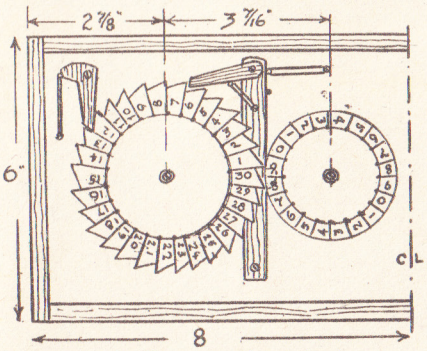


Fig. 1—The automatic mechanism

A detent, seen on the extreme left, prevents the disc moving backwards.

Cut the backboard from deal, about ½in. thick, to dimensions given, the length being, of course, doubled. Run a line along the centre, and on this mark small holes for the pivot screws of the four discs. Now cut some strips of wood ½in. thick and ⅜in. wide, and nail and glue these round the backboard, making a kind of shallow tray of the whole.

To the edges of this, some 3/16in. thick strips of wood are fixed to make a finishing rim, as in detail Fig. 2 (H). These are 1¼ins. wide, so will rise above the cover board, referred to later on, just 1/16in.

Some of the parts, the (T) and (H) discs, for example, are shown full size on the pattern page. The discs (A) are to be cut from 3/16in. wood, and should be sawn out as accurately as possible. It will be best here to sacrifice the page, and stick the patterns of the discs to the fretwood. When cut, the paper might well be left on for subsequent numbering.

The centre hole is bored to admit a ¾in. stout brass round-headed screw as a pivot pin. Exactly on the black spots, drill a circle of holes large enough for a 1in. wire nail to enter. From ¼in. wood, cut two 1in. discs of fretwood and glue these to the back of the discs. Fix the pivot screws in, with a thin brass washer under the heads. The discs should rotate quite easily, but certainly not loosely.

The upright levers (B) are cut from ¼in. wood, two being required. Bore

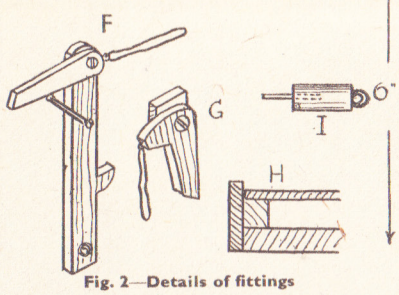


Fig. 2—Details of fittings

screw holes at top and bottom, where shown, ⅜in. flat-headed screws for the top and round-headed ones for the bottom. Cut the pawls (C) from 3/16in. wood, and underneath each drive in a pin, bending it to make a tiny hook. Fit the pawl at the top of the lever with a

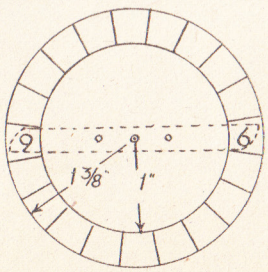


Fig. 3—Circle markings

flat-headed screw, countersinking the latter.

Elastic Drive

An elastic band is hooked to the pawl and dropped over a screw, driven in the lever, where shown. On the right edge of the lever, near the top, fix a second hook, and to this slip on another elastic band. The whole will then present the appearance seen at (F) in Fig. 2.

Fix the levers, where seen in Fig. 1, with the right hand projections just over the centre line. The elastic band on the lever is stretched over a screw, driven in the backboard, and a small nail, serving as a stop, is inserted just below the

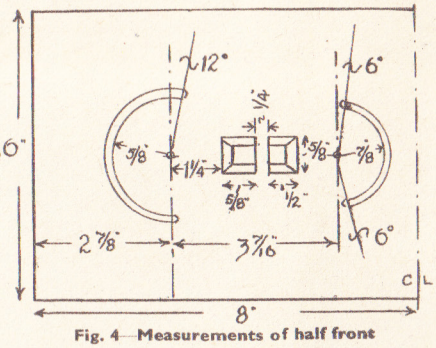


Fig. 4—Measurements of half front

elastic, to prevent the lever being drawn too far back.

Cut the detent (D) from 3/16in. wood and fix a small wire hook where shown. This part should be pivoted with a countersunk screw to a small square of ¼in. fretwood, as in detail (G) Fig. 2, the square being glued to the backboard so that the detent falls into the teeth of the disc at about the position shown in Fig. 1. Hook the elastic band, attached to the detent as in the detail, over a screw head, driven in the backboard.

Testing

Now press the lever to the left, and if all is O.K., the disc will be rotated to the left also. For discs (U) (units) cut two to the diameter in Fig. 3. It will be best here to describe the two circles on to paper and stick to the fretwood, leaving

the paper on for subsequent numbering after cutting.

Divide the circles into 20 equal parts, a job easily done with the aid of a protractor, pricking off divisions of 19 degrees each. Bore a hole for the pivot screw as before. Cut the discs from $\frac{3}{16}$in. fretwood.

Cut two of parts (E) and bore pivot holes at their exact centres. Fix these, one to each disc, to the back of the discs, in the position shown in Fig. 3, where the bar comes just behind opposite divisions. The parts, by the way, are cut from $\frac{1}{4}$in. wood. Fit these discs to the backboard, with a thin brass washer under the heads of the screws.

The Action

It will be as well here to lay a thin cloth washer also under the metal one, to exert a sort of braking effect on the discs, preventing them from moving on their own. Now rotate the discs and at each half turn the lever should rotate the (T) and (H) discs one tooth exactly. See that you get this action correct. Where the divisional lines touch the inner circles, drill holes for the metal plug as done for the (T) and (H) discs.

The discs should now be neatly numbered, as in the view shown in Fig. 1. It is important, when numbering, that the figure 9 should be just above the crossbar (E) on the (U) discs, as shown in Fig. 3. The cover board can now be made.

This is a piece of $\frac{3}{16}$in. fretwood, cut to 6ins. wide and 16ins. long. A half plan of this is shown in Fig. 4, the right half, not shown, being identical. Draw a centre line across and mark the points which coincide exactly with the pivot screws of the discs.

At these points strike the arcs, the two lines to each being $\frac{1}{8}$in. apart. Note that the left arcs extend a little over the half circles, the extension at the top being 12 degrees. The protractor comes in handy here again. The right arcs are 6 degrees short of the half circles at top and bottom.

Windows

Mark out the windows to the sizes given, and then $\frac{1}{8}$in. inside these, cut out the openings. Bevel the edges on three sides to the full dimensions. Try the cover in place and if correctly marked and cut, the arc shaped openings should embrace 17 holes on the (T) and (H) disc and 10 holes on the (U) discs. At the pivot centres bore $\frac{3}{8}$in. holes. Now fix the cover board on with screws at each corner, and in the middle.

The scoring plug, Fig. 2 (I) is a 1in. wire nail, driven about $\frac{1}{2}$in. in a small bit of wood dowelling, then the head being filed off, completes it. Drive in the opposite end a small screw eye and fix thereto a short length of thin cord. Attach these cords to eyes driven in the cover board at about the spots shown in the general view of the scorer.

For Hanging and Scoring

The completed work can be fitted with wall plates at the rear for hanging the scorer, and then be stained, if desired, and varnished. An effective addition to the finish is to blacken the edges of the arc shaped openings and windows.

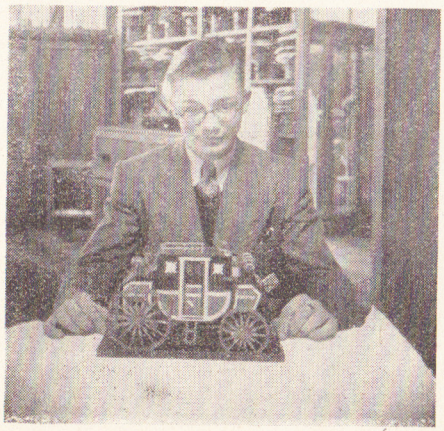
For quick scoring, paper dials should be glued against the scoring holes, as in the general view. These should be numbered from the top downwards, 16 to 1 for the (T) and (H) discs, and 9 to 1 for the (U) discs, the numbers being opposite the holes in the discs, showing through the curved openings.

In use, the discs are turned to the total of points, 301 or less. The numbers shown after scoring are those to be still gained—the usual practice. One point to be noted, after scoring, the scoring plugs can be left in the (U) discs, but never in the (T) and (H) discs.

The material required for making the article, apart from a piece of deal for the backboard and surrounding strips (the $\frac{1}{2}$in. by $\frac{3}{8}$in. ones) is the panels two K3 and one G4.

Two Unusual Pictures of Reader Interest

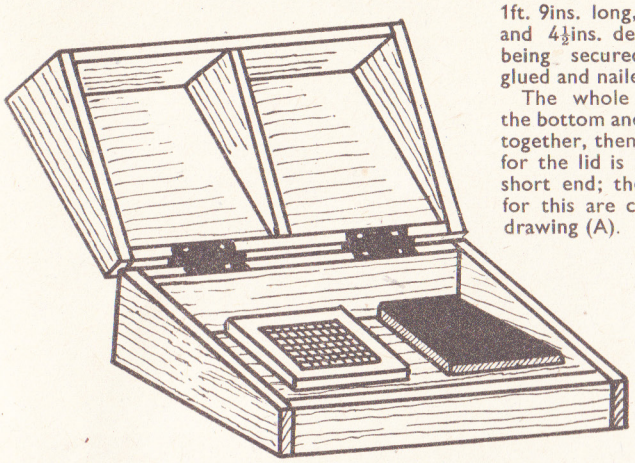
***FROM** the many photographs we receive, the two shown are of particular interest. The one on the right shows a pre-war Hobbies League Certificate owned by Mr. A. Faulkes of Addison Rd., Nechells, Birmingham. He writes—'My son and myself are very interested in fretwork. I have been a member of the Hobbies League before the war, and always had the books for years. I often wonder if the days will come back as the books were before the war. I have also made lots of toys with the help of my son Graham. I sent one of my models to Lewis's show for the best toys in Birmingham'.*



***THE** other picture is of Mr. J. A. Fortune of Drayton Rd., Harlesden, N.W.10. With him is the popular model of the London-Holyhead stage coach he made. He made it when he was 16 years of age, without any woodwork training at all. In addition, he has completed the R.M.S. Britannia, The Halfpenny Galleon and a number of pieces of fretwork. Both our readers must be congratulated, and the pictures will, undoubtedly, be an encouragement to others to follow such examples.*

Apparatus and all needs are contained with this

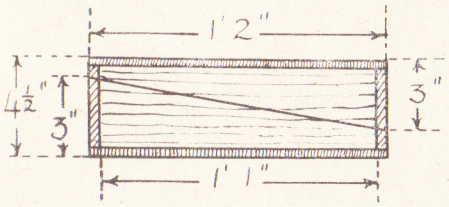
FLAT-BED DUPLICATOR



ALTHOUGH a cheap and easy method of reproducing written matter, the gelatine hectograph is not altogether satisfactory when a considerable number of copies have to be made. The flat-bed duplicator, on the other hand, gives an almost unlimited number of copies and, should the necessary stencil be cut on a typewriter, the finished work closely resembles typewritten matter. The handyman who is responsible for producing concert programmes, club magazines, and so on, will, therefore, find the duplicator an invaluable piece of equipment.

Self Contained

The model described below is self contained, being fitted into a carrying case that holds the duplicator, ink and roller, while a supply of paper can be stored in the lower half of the box under the stencil baseboard.



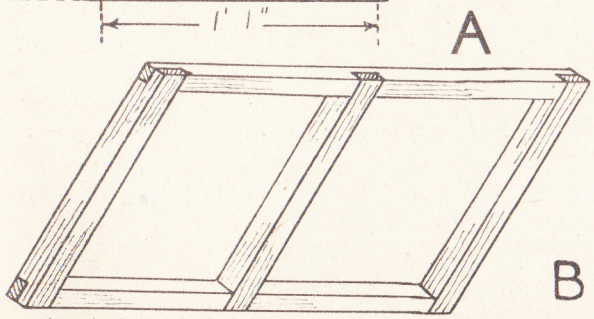
The first step is to prepare the case, using ½in. thick wood for the sides and three-ply for the top and bottom. Outside dimensions of this box are 1ft. 9ins. long, 1ft. 2ins. wide and 4½ins. deep, the corners being secured by ordinary glued and nailed butt joints.

The whole box (including the bottom and top) is fastened together, then the sloping line for the lid is marked on each short end; the measurements for this are clearly shown at drawing (A). This sloping line is cut across with a tenon saw at each end, then the cuts are carried down the sides of the box to separate the lid from the bottom. By making the box in this way the lid must, obviously, be a perfect fit for the bottom.

Framework

A strengthening partition of ½in. thick wood is then glued and nailed into the lid of the box, being situated exactly midway between the two short sides. A framework with outside measurements of 1ft. 8ins. by 1ft. 1in. is made up from ¾in. square wood in the manner shown at (B), and when complete, is glued and screwed inside the lower part of the box hard against the bottom of it. The corners of this framework are simply halved together while the middle rail is fitted by half-lap joints.

The baseboard that carries the stencil frame and ink slab is of three-ply and rests on the ¾in. framing. For the ink slab a piece of slate or glass measuring 8ins. long by 11ins. wide may be used, being held in place by a rebated wooden framework. A simpler method, however, is to use a clean piece of thin iron plate which may be screwed into place. The position of this slab can be seen from the sketch of the finished duplicator, the slab being shaded in black.



Plywood can also be used for the stencil frame. A panel measuring 10ins. wide by 1ft. 1in. high is needed, and from this a rectangle 8ins. wide by 11ins. high is sawn to leave a frame with 1in. wide sides. This framework is hinged along the inside of the bottom edge, so that the whole frame can either be raised or drawn down, so that it rests across the top of the baseboard.

Silk Gauze

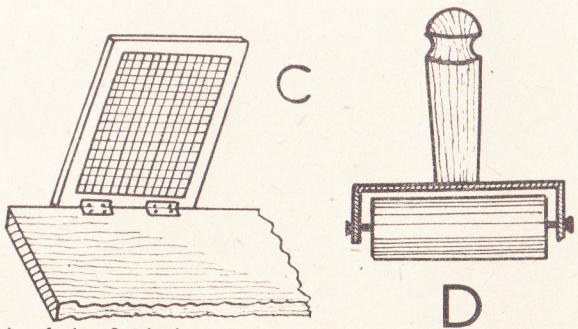
The under-side of the frame (i.e., that nearest the baseboard) has then to be covered, either with a special duplicating 'silk' that can be bought for the purpose, or with a piece of very fine-meshed gauze. This gauze must be stretched across the frame quite tightly, and is held in place by a few dabs of glue. Drawing (C) gives a view of the hinged stencil frame.

A rubber roller for spreading the ink can either be purchased or made up from dowelling. The actual roller is an 8in. long piece of 1in. diameter dowel over which a piece of old rubber hose-pipe has been fitted. A thin piece of metal ¾in. wide and 1ft. 1in. long is bent over at right-angles at each end, the two short arms measuring 1½ins. long.

Handle Piece

A handle is shaped up from a length of dowel of suitable size, and is fastened to the centre of the metal by means of a screw. Short lengths of screwed rod (or even two stout nails) can be fastened through the arms of the metal brackets and into the end-grain of the rubber-covered dowel to enable the roller to run freely. A front view of the roller is given at (D).

The duplicator is then ready for a trial run. Waxless stencils can be purchased at almost any stationer's shop. If a typewriter is available the desired lettering can be typed (the ribbon being 'dropped' so the keys strike direct on to the stencil), or the wording may be written on the stencil with a 'stylo' pen, which is simply a piece of stout bone knitting needle sharpened to a pencil point. Illustrations may also be put in with the stylo pen.



In use the pen must be held firmly so that a clean impression is made on the stencil. When completed, all lettering

(*Continued foot of page* 280)

A few odd pieces of wood will make this novel

'DUMBO' LETTER RACK

THIS cheerful little letter rack is made from four simple fretted parts, locking together and glued for extra strength. Finish should be dark polished wood, or matt black.

The basic parts comprise one body, two legs and the ears. Both the legs and the ears can be drawn out from the dimensions given, the outlines being formed by a series of straight lines and circular arcs.

The body part is of irregular shape and is outlined with squares for easy duplication. Squares are $\frac{1}{2}$in. By drawing a similar grid pattern on to the wood, the correct outline can be marked off.

Body Part

The body is cut from $\frac{3}{16}$in. material, taking care to form the three slots accurately. The leg slots, as can be followed from the grid, extend exactly 2ins. upwards above the base line or feet. The ear slot is actually at an angle of 30 degrees to the vertical. Drill a hole in the rear end of the body and into this glue a length of string for the tail, fraying out the end of the string slightly.

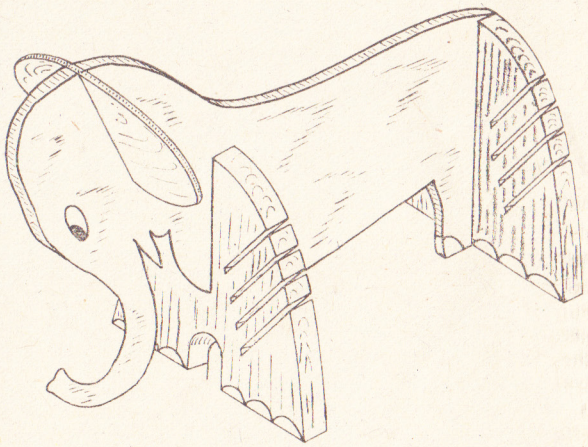
The front and rear legs are identical and cut from $\frac{1}{4}$in. material. The slots to carry the letters are sawcut carefully and filed or finished to approximately $\frac{3}{32}$in. width. They rake upwards at an angle of 60 degrees and are spaced $\frac{1}{2}$in. apart.

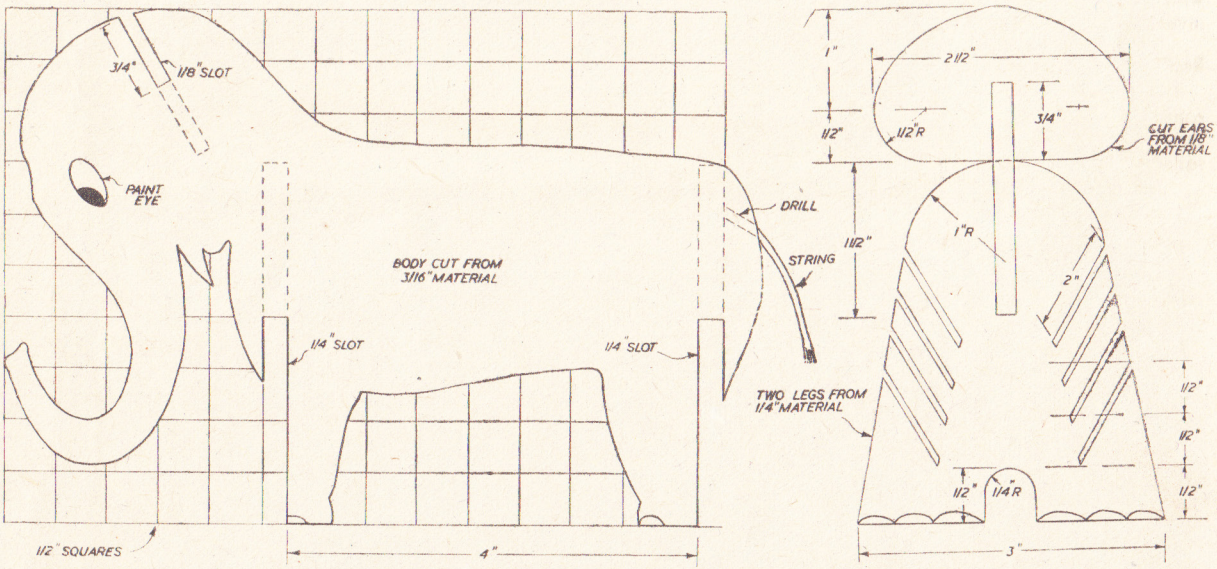
The ears are fretted out in one piece from $\frac{1}{8}$in. material.

Assembly of the letter rack is then quite obvious. A thin coating of glue should be used to make all three joints permanent and the assembly left to dry before finishing and polishing.

It is suggested that the toe portions of the feet be scored into the wood, or painted in white. The eye should also be painted in. Square edges can be sanded off the body, particularly around the head and trunk.

For a simple exercise in fret-working, the result is very pleasing, and the cost not more than a shilling or so. (339)





Outline drawings of the central animal portion and the cross stand pieces

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Duplicator—(*Continued from page 279*)

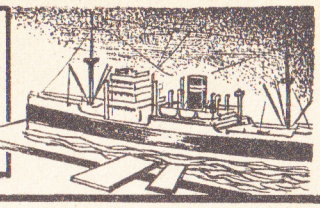
and drawings should show up clearly when the stencil is held up to the light.

Some duplicating ink must be squeezed on to the ink slab and is worked round the roller until both slab and roller are evenly coated. A piece of blotting paper is laid over the stencil baseboard, the stencil is placed on it (right side upwards) and the stencil frame pulled down to cover the stencil. The inked roller is then run up and down the gauze a few times, causing the stencil to adhere to the fabric.

It may be necessary to run the roller over the gauze a considerable number of times before the ink penetrates the stencil properly, and by having some blotting paper beneath it much wastage of paper can be avoided. When the ink is flowing properly, put a small pad of duplicating paper in place beneath the stencil. Pull down the frame, draw the roller from top to bottom of the gauze, lift the frame, remove the duplicated sheet, and repeat the process as often as necessary.

When the required number of copies have been made, peel off the stencil and clean off all surplus ink on the frame with some paraffin oil. (345)

The SHIP MODELLER'S Corner



THIS week we are going to leave our sailing ship models and deal with one of the awkward jobs which we come up against when making models of the more modern types of vessel.

Our subject this week will be the making of the stanchions and rails which are used so much on modern ships.

For small models the method, which has the merit of simplicity and is at the same time effective, is to use fine cotton thread.

First make a jig as in Fig. 1. This is a strip of thin wood about 10ins. long and wide enough to take 3 or 4 rows of

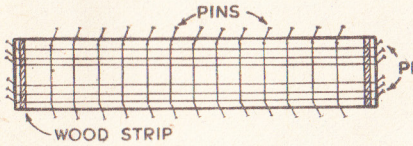


Fig. 1—A jig for thread rails

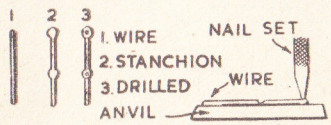


Fig. 2—Realistic stanchions

QUESTION AND ANSWER
By 'Whipstaff'

Question: What are 'Bilge' pieces?

Answer: Bilge pieces are long pieces of iron or wood affixed to the outside of the bottom of the ship, in a position so as to offer resistance to the water as the vessel rolls and thereby lessen the motion.
Also they decrease the diameter of the turning circle of the ship, by preventing the 'skidding' motion of the vessel as the helm is put over.

Question: What are studding sails?

Answer: These are sails set outside the square sails on each side of the ship. They are spread at the top upon the yards, and at the bottom by booms; they are set upon each side of the foresail, fore-topsail, fore-topgallant sail, main topsail and main-topgallant sail.
They are named by their respective masts; as—main-topmast studding sail, fore-topgallant-studding sail, etc.

railings, according to the amount needed on your particular model.

Mark off the distance apart for your rails on each end and along each side edge, the points for your stanchions; drive in at each point a 'lill' pin or fine fret pin.

Now glue a strip of thin wood across each end of the jig; this is to raise the rails off the jig. Fasten your thread from pin to pin lengthways for the rails and across from pin to pin for your stanchions. Give the whole a coat of shellac—1 part of shellac dissolved in 2 parts methylated spirit.

When dry cut out your lengths of rail with a razor blade and glue in place on your model. They can be painted before fixing if required. You will be surprised how firm rails prepared in this way can be, for small scale models.

For larger models use thread for rails and slivers of bamboo for stanchions, leaving the bamboo stanchions longer at the lower end. These can then be inserted in small holes drilled in the deck and glued there. Bamboo can be slit and scraped almost to the thickness of a hair with a single-edged razor blade.

When using bamboo for stanchions it is advisable to drop a spot of glue or cement on each point where the rails cross the stanchions, before applying the shellac.

And now to large scale models. For these fine wire can be used for stanchions, cut in lengths and flattened with a nail set where the rails are to pass through, as in Fig. 2. Drill holes for rails before fixing in position on the decks. Pass fine wire for the railings through and drop a spot of 'Solderine' cold solder on each end where the rail finishes off; this will secure them firmly.

Fine wire can be obtained by untwisting some ordinary electric light flex, or fuse wire can be used.

Experienced modellers with a precision lathe can turn correct stanchions in brass for large scale work, but few modellers possess the necessary equipment. For them, here is a simple method which is very realistic in its effect.

Obtain some small cotter pins that will suit the scale of your particular model and make a jig as in Fig. 3. This consists of two small blocks of metal. On one face of each block file a shallow vertical groove of a depth

RECOMMEND HOBBIES TO YOUR FRIENDS

half the diameter of your cotter pin. For example, if your cotter pin is $\frac{3}{32}$in. in diameter, your groove will be $\frac{3}{64}$in. deep.

Our interesting and regular feature
by 'Whipstaff'

Another groove or grooves according to the number of rails, is filed in at right angles to your first groove. By placing a wire or fine nail between the cotter pins where the rails are to pass through and squeezing in the jig between the jaws of your vice, the cotter pins will take the correct shape for stanchions.

Never throw away any jig once made, you never know when you will need it again.

Stanchions can also be made of twisted wire, as in Fig. 4. Naval type by filing nicks in brads and soldering the wire across as in Fig. 5.

Plain wire stanchions can be inserted in position and by using two threads twisted between each stanchion a very effective set of railings can be made.

Ornamental rails and stanchions for other types will be treated in a later article.

In closing, may I thank the many readers who have written us of the appreciation of this feature and those who have sent us their problems? Do

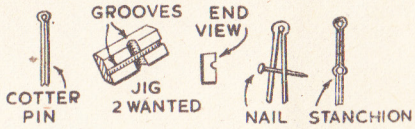
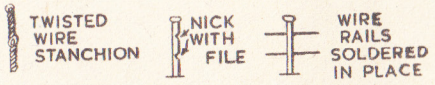


Fig. 3—Jig and cotter pin



Figs. 4 and 5—Brads for naval type

continue to send your queries and also any suggestions for any aspect of ship modelling you would like to see included in your own section of our paper.

Errata—

On page 91 of 'Hobbies Weekly', November 8th there is a small printers' error. In our review of 'The Ship Modeller's Workshop', paragraph 3, read '$\frac{1}{8}$in. scale and upwards' instead of '$\frac{1}{3}$in. scale and upwards'. It is quite practical to 'joggle' planks at $\frac{1}{8}$in. scale.

How the handyman can make for himself

A MODERN PANTOGRAPH

THE design of pantograph illustrated differs somewhat from the more common pattern; it is based on the lines of a professional instrument, and efficient in use. Readers who require to reproduce, natural size, any design, as many do, will find it invaluable. It is capable, also, of enlarging or reducing designs as well, and is reasonably simple to make.

Fig. 1 shows the instrument ready to copy natural size. For making it, cut

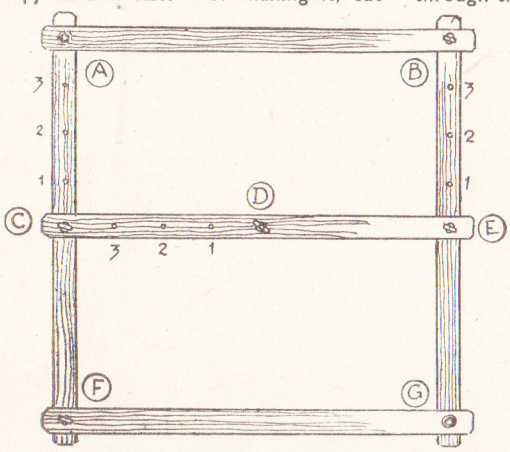


Fig. 1—The completed article

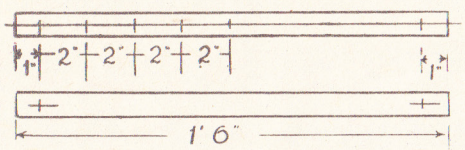


Fig. 2—Rails for marking

five strips of $\frac{3}{16}$in. fretwood to a width of 1in. and lengths given in Fig. 2. On each, at 1in. from the ends, make a mark with an awl, where the holes for the joints will come later. On three strips only, prick off the points shown in the upper illustration, and at these points bore $\frac{3}{8}$in. holes through. The end holes will be bored now to suit the particular style of joint.

The Joints

At Fig. 3 some five of these joints are drawn, and it is important to use care over the matter to ensure free running of the instrument. The joint at (D) is the centre of movement. From the hardware shop buy five screw eyes 1in. long, exclusive of the rings or eyes.

With these a few brass washers with $\frac{1}{8}$in. holes will be needed. Smooth the washers with emery cloth to remove any edge ridges or burrs, and ensure an easy motion of the joints. With joint (D) a piece of hardwood 1in. thick and $2\frac{1}{2}$ins. long will be wanted. This is shaped as shown, the thinned ends to be afterwards screwed down to the board.

Now with a washer above and below the middle hole in one of the strips, push a screw eye through, as shown, and tighten enough to allow free motion, and no wobbling.

For the joints at points (B), (C), (E), (F) a screw eye and three washers will be required, also a 1in. disc of fretwood for each joint. It will be seen from the illustration that a washer goes between the strips, one underneath and one under the screw eye. The latter goes through the lot and is driven in the disc below.

It may be advisable here to use a piece of thicker wood for the discs, if any is to hand, as no sharp point of the screw eyes must protrude to scratch the paper underneath, when the instrument is in use.

The joints at (A), (G) are shown in Fig. 4, the left side illustration depicting a side view of the joints and next to it a detail of their construction. For each a $1\frac{1}{4}$in. piece of brass tubing will be needed, with an internal diameter of $\frac{1}{4}$in. or $\frac{5}{16}$in. To each piece of tubing, three thin metal washers will be required,

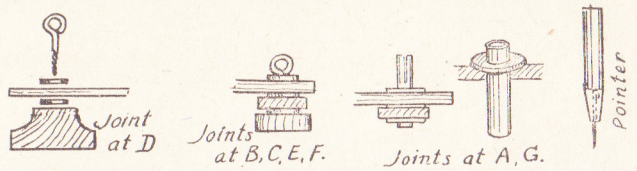


Fig. 3—Detail of the joints

Fig. 4—Fixing joints and pointer

about $\frac{3}{4}$in. diameter, and with a hole just large enough to pass over the table.

Clean the ends of the tube, and as shown in the detail sketch, support the tube in a vertical position with $\frac{1}{8}$in. of it sticking up. A suitable hole in a piece of scrap wood will be a good support.

Press one of the washers over and solder it to the tube. Remove tube, and having previously bored suitably sized holes in the ends of the selected strips, push the tube through from beneath. Insert a washer between the strips, place another above, and solder that to the tube also. Keep all close together while soldering the top washer, then the joint should be free to move easily enough, but not to shake at all.

The Pointer

All woodwork should now be glass-papered, if not done before. There is really no need to varnish it, as it is better left plain with no danger of varnish sticking to the various joints. To complete the instrument, a pointer will be needed. This is a short piece of $\frac{1}{4}$in. dowel rod, with a thin nail driven in one end, filed to a blunt point. It is shown in Fig. 4.

Gently rub the point over fine emery cloth to prevent it scratching the design as it traces its outline. A pencil will also be wanted, obviously, and if too thick to pass through the tubes at (A) or (G) it can be easily glasspapered down a little.

Both the pointer and pencil must be a fairly tight fit in the tubes, and if these are slit down a little at the top, like a pencil protector, they will grip both pencil and pointer and hold them securely.

In Use

In use the block under joint (D) is screwed to the board; somewhere about the middle would be about the best place. The holes in the strips should be numbered, as shown in the drawing of the instrument, and the design pinned under (A) and the paper for copying it under (G). As arranged the pantograph will reproduce the design its natural size, the pointer being held between the fingers of the left hand and traced over the design, and the pencil, at (G) in the right hand, pressed lightly to the paper to copy the design.

For enlarging, shift the crossbar at the middle to any of the side holes, according to the degree of enlargement required. The screw eye at (D) should also be shifted along to a hole of the same number. Then proceed as before. For reducing, shift the pointer to (G) and the pencil to (A). A few trials will soon show the degree of reduction or enlargement possible.

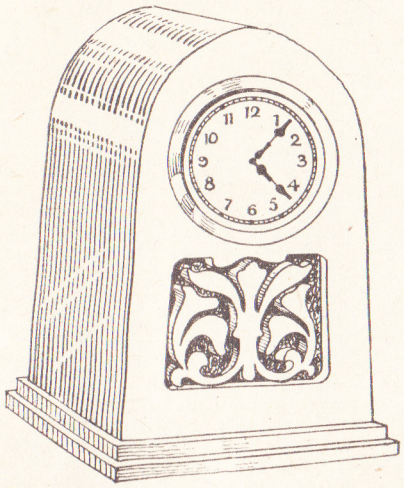
If any particular reduction or enlargement, other than that to be obtained from the existing holes is required, intermediate holes can be bored to suit.

If the instrument is to be used on a proper drawing board, it may not be considered wise to screw it to it, as the holes will injure it possibly for future and other uses. In this case, screw a strip of stout metal to the base of the block at (D), the metal extending $\frac{1}{2}$in. over each end. In these extensions drill fine holes and secure the block to the drawing board with a drawing pin, pushed through the holes in the metal strip.

For this instrument, a piece of fretwood $5\frac{1}{4}$ins. wide and 1ft. 6ins. long will provide enough wood for making. A thickness of $\frac{3}{16}$in. will be quite enough. The discs, etc., can be cut from any scrap bits of wood available.

With a few pieces of fretwork you can easily make a

NEW CASE FOR OLD CLOCK



THERE must be quite a number of workers who would wish to undertake the job of making a new clock case for a movement which they have by them. Or for a movement the case of which has become broken or out-of-date. Now, here is a design for a case of quite modern outline, and with little added decoration. Some may even prefer the face of the case to be plain without any panel design, in which case the polishing or finishing is much simplified.

The size of the completed case here shown is, height 8½ins., width 5¾ins., and depth 3¼ins. The actual case itself, however, will measure 8ins. high, 5ins. wide and 2½ins. deep, and wood ¼in. thick is used throughout. The general construction of the case is seen in Fig. 1 and a general description may be given to clear any point not quite apparent in this detail.

The Base

The base is made of two pieces, as (A) and (B), (A) being 5¾ins. by 3¼ins., and (B) 5½ins. by 3ins. If needed, an economy in wood can be effected by having the lower member (A) made in 1in. strips mitred at their ends to an angle of 45 degrees and glued to the underside of piece (B).

If thicker wood, say, ⅜in. or even ½in. could be spared for the lower base (A), this would be a distinct advantage, both in appearance and for its value in giving weight to counterbalance, the weight of the clock movement.

The front (C) of the case and the back (D) are identical in outline, but the front will have the two openings made, as shown, the back only having the one circular opening for the reception of the movement. The square opening in the front will be backed later by a panel of wood about 3½ins. square, which will take the fretted overlay to be glued to it.

The front and back of the case are held together by the four pieces (E) which measure about 1¼ins. by 2ins. Note here the grain of the pieces run upwards and not across, so that the glue will hold to the front and back of the case better than it would do if the grain ran from back to front of the pieces. For it is well known that glue will not bind satisfactorily to end grain.

These pieces, be it noted also, will be glued with their faces flush with the edges of front and back, in order to take the side covering pieces which consist of thin wood bent to shape at the top of the case and glued on. At the top point of the case there must be a widish rail (F) to take the meeting edges of the sides.

Top Rail

This rail is best made of two pieces of wood ½in. or so wide by, of course, ¼in. thick, and glued together and chamfered to the shape of the case at that point.

The wood for the sides of the case may be 1/16in. thick, cut rather wider than the case itself, so after gluing on, the over-hanging edges may be cut away and glasspapered to the true surface of the front and back of the case.

In Fig. 2 we show a useful diagram for getting the true shape of the case and for the decorative panel on the front. On the right hand side of the diagram the squares are ¾in., and when these are drawn out either on the wood direct or on to the paper, it should be a simple matter to complete the outer shape of the case and the panel design by following these carefully. Complete the whole design of the panel and transfer this to the wood.

Decoration

Next cut the decorative work in the usual way with the fretsaw and then glue it down to the backing board.

The oak leaf design shown in Fig. 3 would look well as a piece of simple carving. Outline the leaves, etc., on 3/16in. or ¼in. wood and cut them out carefully. Then glue them to the backing board in the usual manner and make the carving complete by using a sharp penknife or small carving chisels. Note the veins of the leaves, how these are cut in and the recessing brought up to them.

Round the acorns and their cups, and make little cut-in recesses to show their roughened surface. Round the stems also and then smooth off certain places with a piece of fine glasspaper glued round a piece of 3/16in. diameter rod. The whole panel when complete and with its carved overlay attached, will be glued inside the clock case and this then will be attached to the base by means of screws and glue.

Fig. 3—Carved decoration

Polish Finish

The case and its base can now be finished in any desired way, either french polished after being suitably stained according to the kind of wood that has been used, or stained and wax polished. Care must be taken not to get any of the stain and polish or the wax on the matted background surrounding the fretted or the carved panel.

The raised surface of the fretted panel could, however, be coated and polished, if desired, to make the design stand out prominently from the background.

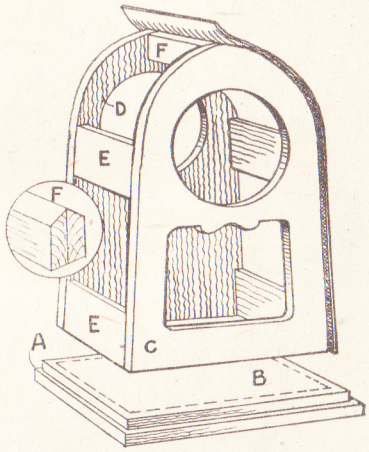


Fig. 1—General construction

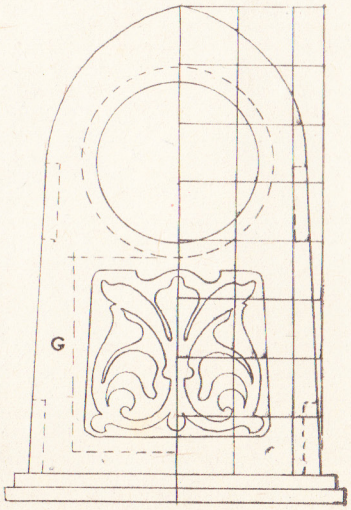


Fig. 2—Plan view of front

Experiments with less common lead compounds in HOME CHEMISTRY

THE compounds of lead stand out in the chemist's mind because of the high proportion which are insoluble or sparingly soluble in water. When thinking of this we recall the commoner ones, such as lead chromate, carbonate, sulphate, iodide and chloride. This property extends to many of the less familiar compounds with which this article deals. Notable exceptions are the two basic acetates of lead formed by dissolving lead monoxide (litharge) in boiling lead acetate solution.

Reactions

Try this in a test tube, adding the oxide in very small portions until no more dissolves. If you filter the solution you will find it still gives the reactions for lead acetate, but if you pass in carbon dioxide it gives a white precipitate of lead carbonate, which normal lead acetate does not. So avid for carbon dioxide is this solution that it quickly becomes milky by absorbing the carbon dioxide present in the atmosphere. This property gives us a useful test for carbon dioxide.

We all know the two common oxides of lead, litharge and red lead. There are, however, three others, two of which we can prepare quite easily. These are lead dioxide and lead sesquioxide.

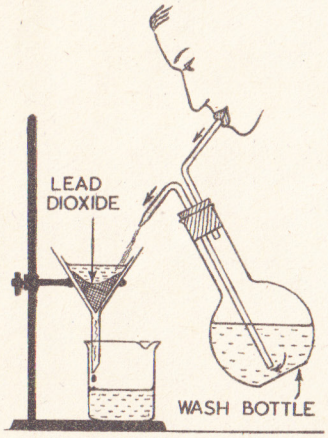


Fig. 1—Washing on the filter

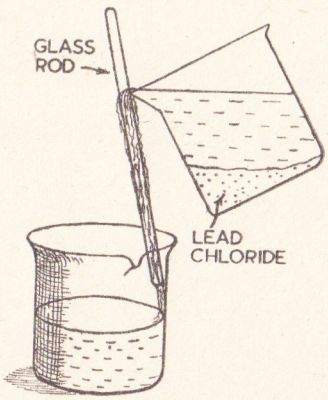


Fig. 2—Washing by decantation

Lead dioxide is brown and is the brown paste we see in accumulators. The most convenient way of preparing it is by acting on red lead with strong nitric acid in the cold, or by boiling red lead with dilute nitric acid. The red lead is converted into brown lead dioxide and lead nitrate goes into solution (if you filter and evaporate to small bulk, white crystals of lead nitrate will crystallise out). Filter off the lead dioxide, wash on the filter with water, then empty it out into an evaporating dish and dry it in the oven.

This brown oxide is a powerful oxidising agent, as you may readily see by mixing a gram or two with a fifth of its weight of sulphur and grinding the mixture in a warm mortar. The mixture becomes red hot and forms lead sulphide.

Lead sesquioxide is orange in colour. To prepare it add sodium hydroxide to lead acetate solution. This precipitates a hydroxide of lead. Warm the mixture but do not boil. Now add more sodium hydroxide a little at a time until you have a clear solution. Add sodium hypochlorite and allow to cool. The orange lead sesquioxide is gradually precipitated. If you wish to keep the specimen of this lesser known oxide, filter and wash it, then dry it in the oven.

Keep Your Chemicals

Indeed, it is good practice and sound economy to keep *all* the stable chemicals you prepare, for often it happens that you need a small quantity for a test or experiment. To have it at hand is better than having to set to work to prepare it.

It is also useful to keep an experiment book, noting down how you prepared each chemical, so that when you have used up a specimen you can make a fresh supply without having to do a lot of looking up. Number each experiment in the book and write the experiment number on the specimen tube label.

What Happens?

Here is a question for you. What happens when sulphuretted hydrogen is bubbled through a solution of a lead salt? Lead sulphide is formed? Not always. With lead chloride solution instead of the black lead sulphide we get a yellow or red precipitate of lead *chlorosulphide*. Only when you pass in an excess of sulphuretted hydrogen is it converted into lead sulphide.

Owing to this danger of overshooting the mark you will find the experiment easier to control by using sulphuretted hydrogen *water*, which you can make by bubbling the gas through water for about a quarter of an hour (do it outside, or the family will complain!).

Lead Chloride

To make the lead chloride solution mix lead acetate with sodium chloride, wash the white precipitated lead chloride by decantation and boil it with enough water to dissolve it. When the solution is cool pour off from the portion of the lead chloride which has crystallised out and add to it gradually sulphuretted hydrogen water until the liquid is opaque, filter off the precipitate and to the filtrate add more sulphuretted hydrogen water.

Repeat this process until the filtrate begins to give a black lead sulphide precipitate instead of a yellow or red. Reject this last portion, of course. Wash the lead chlorosulphide on the filter and dry in a moderate oven.

Lead Oxychloride

Another strange lead salt is lead oxychloride. Take some lead monoxide and boil it for several minutes with twice its bulk of sodium chloride which has first been dissolved in a little water. Filter it off (keep the filtrate), wash it, dry it, then heat it in a crucible. It will become brilliant yellow. This makes a good pigment and is known as Turner's yellow. If you now test the filtrate with red litmus paper you will find the paper becomes blue, thus showing an **alkaline** reaction. Sodium hydroxide has also been produced in the reaction. This method was once used to manufacture caustic soda.

Lead Thiosulphate

Lastly, let us examine lead thiosulphate. Add sodium thiosulphate to lead acetate. White lead thiosulphate is precipitated. Now add more sodium thiosulphate. The precipitate dissolves. On account of this solubility of lead thiosulphate in excess of the precipitant we must take care not to add too much sodium thiosulphate in preparing this lead salt.

Repeat the experiment, adding the sodium thiosulphate a little at a time, allowing the precipitate to subside after each addition. When a fresh addition to the clear supernatant liquid causes no further precipitate you may filter and wash the lead thiosulphate and dry it.

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Cleaning Coins

IF you have an old coin do not emery paper it, as this rubs off the writing. The best way is to put it into a potato. Leave it for a day or two, but keep moving it in different places. In time the coin cleans. Then rub over with a soft duster and you will see the printing on it.

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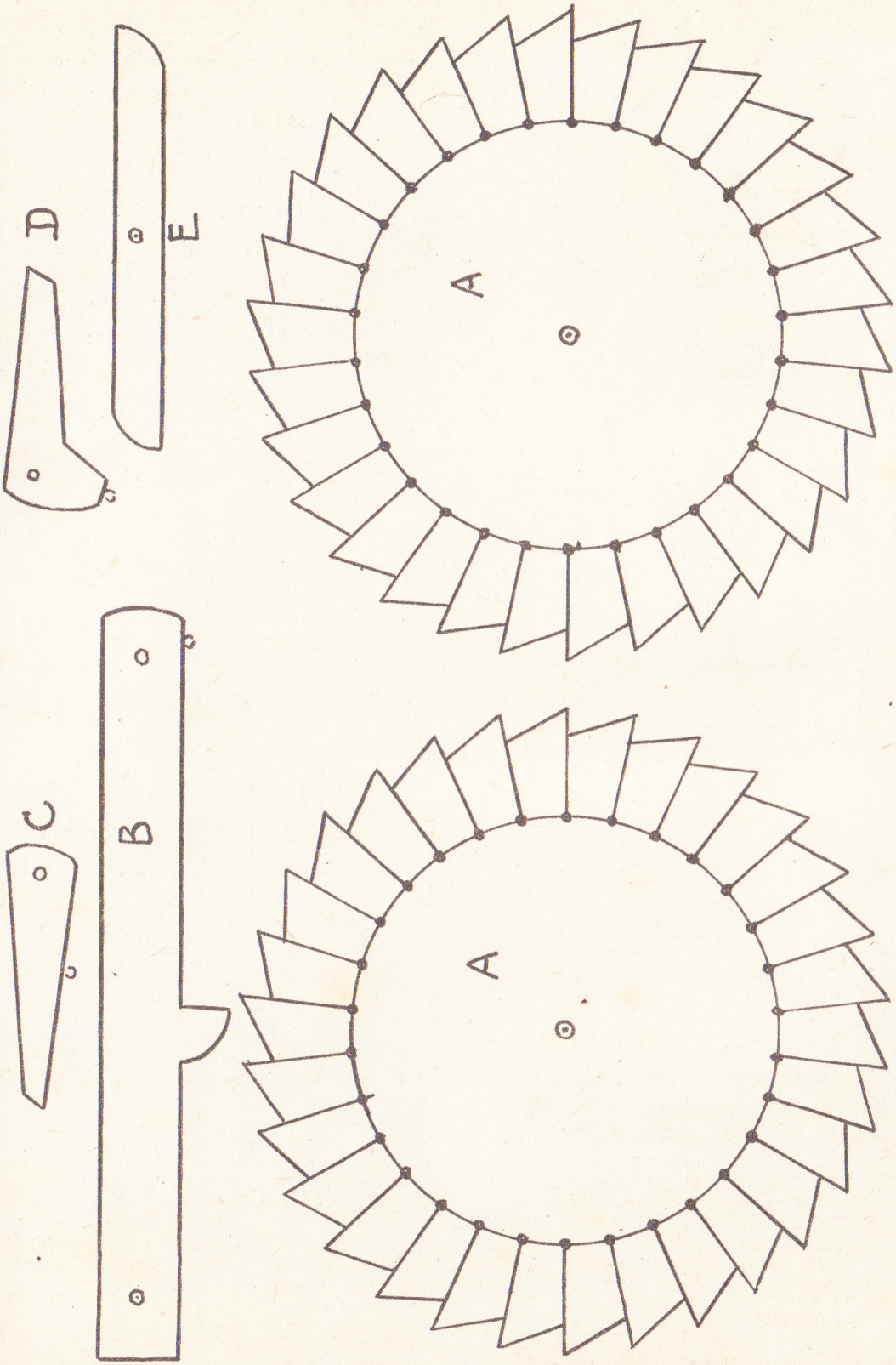

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